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No. 63

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BIOTECHNOLOGY

TEAM IDENTIFIES GENETIC MATERIAL INVOLVED IN HLA SYSTEM

Paris LE MONDE in French 2 May 81 p 32

[Article: "French Researchers Have Succeeded in making a Human HLA Gene"]

> [Text] A French team at the Marseille-Luminy Center for Immunology working under the auspices of the National Institute of Health and Medical Research [INSERM] and National Center for Scientific Research [CNRS], in collaboration with the "Gene Biology" unit of the Pasteur Institute of Paris, has just identified a part of the genetic material involved in the human HLA system.

It has been known for a long time, particularly as a result of the work of Prof. Jean Dausset, 1980 Nobel Prize in Medicine and Physiology, that certain proteins synthesized by the cells are one of the important links in this complex system which plays a fundamental role in the defense of the body against what is foreign to it and in the recognition of what is part of the body itself.

For several years the HLA system (called the H-2 system in the mouse) has been suspected of being involved in numerous biological mechanisms. Fascinating in many respects, this system is today the object of a great deal of study, both on the basic research level and in the area of medical application. Some time ago the appearance of techniques for genetic manipulation, offering a new tool for comprehension of biological mechanisms, permitted new research to be undertaken in this field, from which the first results are now beginning to emerge.

The work done by the Marseille team began last November, growing out of a collaboration with Prof. Philippe Kourilsky's team at the Pasteur Institute of Paris. One of the objectives was to produce in the laboratory, using techniques of genetic manipulation, certain protein components which play a role in the HLA system. It is impossible, from a given protein, to backtrack to the gene, that is, the precise zone of the genetic material which, in the cell nucleus, controls and directs synthesis; the protein; but in the inverse case, if one has the gene, one can integrate it into a certain living system (bacterium or cell culture, for example) to obtain a laboratory tool capable of reproducing in its entirety the sequence of cellular events which lead to the production of a biological structure. From an intermediate (messenger RNA) isolated from the mouse, a mediator between the deoxyribonucleic acid (DNA) of the cell and the surface protein of the cell, the Marseille team contrived to backtrack on the course of events. The researchers thus obtained a portion of the DNA which controls protein production for the mouse version of the HLA system.

The second part of the work consisted in "splicing" this DNA, "labeled" beforehand with a radioactive substance, into some human genes introduced into viral structures, a virtual bank of genetic material produced--and loaned to others--by an American team.

The researchers have obtained clear evidence that they have really located and identified a human HLA antigen [sic; more likely "gene" is meant]. The next step will be to get the gene to be "expressed" by a cell into which it has been integrated. This work is presently in progress. "Though in our opinion these results represent a world first," Bertrand Jordan (Marseille) is careful to point out, "it is important to emphasize that first and foremost the results are the fruit of a collaboration among several French teams and that numerous studies are in progress on this subject, particularly in France and in the United States."

9828
CSO: 3102/258

CHEMICALS FRANCE

ENHANCED OIL RECOVERY: FRENCH EXPERIENCES, ACHIEVEMENTS

Paris L'INDUSTRIE DU PETROLE GAZ-CHIMIE in English Apr 81 pp 53, 57, 61, 65, 69

[Article by Jeanine Jaques]

[Excerpt]

French experience : the role played by the IFP

Improving hydrocarbon recovery is not a new idea for the French oil industry. The CFP and the SNEA first launched « miscible » operations in 1960 (gas injection at Hassi-Messaoud) and the Institut Français du Pétrole began participating in the world's largest « in-situ » combustion experiment in Rumania. Parallel to these industrial projects, French crude producers and the IFP joined together to form the Association de Recherche sur les Techniques d'Exploitation du Pétrole (ARTEP : The Research Association for Oil Extraction Techniques) in 1970 and implemented an extensive research program concerning enhanced recovery processes, and more particularly, thermal and chemical processes (see L'Industrie du Pétrole, special issue, 1979, 10th World Oil Congress). The research program launched in 1973 with state backing was supplemented by a number of basic studies carried out by the DGRST at university and CNRS (National Scientific Research Center) level to obtain essential knowledge and study real applications which would provide a certain amount of practical experience in the field of improved recovery.

Since the French Hydrocarbon Program was launched, enhanced oil recovery and the valorization of heavy oils have been amongst the main targets. The French oil industry, which already has extensive experience in this field, is starting to acquire the necessary technological tools. Even before the French Hydrocarbon Program was launched, the public authorities backed two series of tests carried out by Elf Aquitaine at Chateaurenard concerning the use of polymers and microemulsions. The first was undertaken with the collaboration of the ARTEP, and the second with the IFP with a grant from the EEC. The French Hydrocarbon Program launched at the end of 1979 is mainly based on building pilot production centers and experimenting with new techniques which should contribute to higher extraction rates and better valorization of heavy oils. The pilot centers launched in 1980 already number six : three in France (Saint-Jean de Maruejols and Chateaurenard, for the SNEA(P), Marienbronn for the CFP) and three abroad (Tunisia and Indonesia). In all these experiments and schemes, the IFP is the driving force. Its role is based on two types of activities : research programs and participation in pilot schemes.

The program centers around four main areas : the injection of water enriched by chemical additives (chemical processes), thermal processes for the valorization of heavy oils (in-situ combustion, etc.), the injection of carbon dioxide and the application of these processes to cracked reservoirs. It aims at acquiring the knowledge needed to implement these technologies in concrete cases which already have applications in numerous pilot schemes. The desire to acquire industrial-type experience of enhanced recovery processes has lead to feasability studies being carried out on real deposits in Algeria, Japan and Turkey, thanks to active participation in the SNEA and CFP pilot operations in France and abroad, and in experiments carried out in certain eastern countries (Hungary, Rumania, USSR).

In this respect, the IFP has 25 pilot schemes already operating or under preparation. The most important experiment concerns Franco-Rumanian cooperation implemented more than 10 years ago for carrying out in-situ combustion. The agreement signed in 1969 and renewed in 1979 during the 10th World Oil Congress in Bucarest provides for the participation of the IFP in the development of the Suplacu de Barcau heavy oil deposit. The operation launched is the most important application of in-situ combustion in the world and concerns 250 wells and has a recovery rate of 45 %. This work should have repercussions on the coal in-situ combustion experiment being carried out in a deep well at Bruay-en-Artois within the framework of the GEGS (Underground Gas Study Group) by the IFP, GdF (National Gas Authority), CdF (National Coal Authority) and BRGM (National Mining and Geological Research Bureau).

The IFP is also studying the possibility of applying CO_2 *injection to heavy oil deposits, wich is raising much interest in the United States and is to be used by Total at Marienbronn. In this respect, Total is participating in an experiment launched on behalf of BP at the Egmonton field in Great Britain by a joint venture also including BP, the SNEA and the CFP and the probable implementation of a pilot scheme on the Coulommes-Vaucourtois field by Petrorep.*

With respect to chemical processes, the IFP is participating in pilot schemes (polymers) in the eastern countries (Hungary and the USSR) and in the preparation of future pilot schemes planned by the CFP in Tunisia and Indonesia to experiment with chemical additives (surfactants).

SNEA achievements

The teams from Elf Aquitaine who discovered an infinite number of « vintage » crudes, from the lightest to the heaviest, had to learn to master the whole range of traditionnal methods before attacking improved recovery techniques, fistly in the laboratory, then out on the field. Which some twenty operations underway, the SNEA, together with Exxon, Shell, Amoco, Arco, Mobil and Philipps, is one of the most active groups in the world with respect to enhanced recovery operations. The SNEA, which has research centers at Lacq, Pau and Boussens, is to invest 32 million francs in E.O.R.

Amongst the methods used, miscible gas injection processes are by far the most important. In this respect, Elf Aquitaine participated in a particularly spectacular operation with the CFP : the injection of lean gas launched in 1960 at Hassi-Messaoud, later taken over by Sonatrach. The final expected recovery level is 30 to 40 %. The injection of wet gases capable of considerably increasing recovery at reasonable sweeping rates, was launched in 1968 on the Rainbow field in Canada. The production of accumulated oil carried out on the field using this process amounted to 73 million tons at the end of 1980 and the Aquitaine Cy of Canada expects to recovery almost as much. In the North Sea, partial pressure maintenance by the injection of rich gases gave such excellent results at Ekofisk that the use of water injection scheduled for 1981 is being reconsidered. Elf Aquitaine and Philipps Petroleum carried out a comparative survey of the two methods. The conclusions had serious consequences both as concerns the size of the reserves concerned and the investment outlay needed.

On home territory, the SNEA score a first at Upper Lacq with a horizontal drilling operation (300 metres covered) in association with the IFP. The experiment, which developed Flexodrilling techniques, should enable vertical fractures of certain deposits to be linked together, improve drainage, facilitate the injection of steam in the wells and improve the recovery of heavy and viscous oils. In two fields — seat injection and improved water — the SNEA's work is at the pilot stage. At Upper Lacq, steam injection yielded 200,000 extra tons of oil over two years, worth approximately 8 million francs, amortizing 2/3 of the capital outlay for the project. But the profitability of this method is still not proved in this particular case.

On the small Chateaurenard field, near Montargis, Elf Aquitaine in stalled two pilot schemes designed to study water injection techniques, enriched in the first case with polymers and in the second case with surfactants (micro-emulsion flooding). The polymer experiment launched more than ten years ago, initially under the form of research in liaison with the ARTEP, lead to the setting up of a polyacrylamide injection pilot scheme in the southern part of the field. For microemulsion flooding, a pilot scheme was set up in 1978 in the northern part of the field on the small Chuelles deposit. Two thousand, five hundred cubic meters of oil were delodged in ten months. But the cost of the operation (30 million francs), partly financed by the EEC, is very high. The two methods experimented with on both parts of the field are currently being investigated.

A part from the case of Chateaurenard, research carried out in cooperation with chemical companies (Rhône-Poulenc, in particular), should establish the profitableness of the costly methods that the profession is reluctant to invest in.

Amongst the heavy oil valorization methods, the SNEA has not only studied the injection of steam developed at Lacq but other processes as well, at the Pau research center. CO_2 injection tests were launched in March 1980 at Grenade-sur-Adour on an accumulation of heavy oil operated by the group in a joint venture with Shell Française. The shutdown of pumping operations in the spring of 1980 was followed by an observation phase concerning pressure build-up in the reservoir. Although technically sucessful, even in the initial phase, the experiment did not produce a substantial amount of oil. As concerns heavy oils, the SNEA has other projects in the making : Saint-Georges de Maruejols in France, Cold Lake in Canada, Poso Creen in the United States. In this respect, the promising beginnings of the commercialization of long stroke pumps originally developed for the Emeraude field and manufactured by Mape, should be noted.

Esso Rep : worth the effort

Since 1974, Esso Rep, the leading French oil producer has devoted enormous efforts to improving the recovery of hydrocarbons in older fields. The results were more than encouraging in 1980. The production of the Landes and Gironde fields was thus increased by 18 % with respect to 1979. Although at the time of their discovery, the Parentis, Lugos and Cazaux fields were only expected to produce for some 20 to 25 years, today these fields have found renewed vigour, or at least increased production. The increase in oil prices lead Esso Rep to reconsider extraction conditions for its larger fields. Complex studies carried out since 1974 have enabled more accurate knowledge to be gained as to the structure of reservoirs. The geologists and engineers on the field were thus able to locate impregnated zones and determine the drainage sectors for each of the existing wells. The studies showed, for example, that certain parts of the reservoirs, at Parentis, Cazaux and Lugos, are not drained at all, either because they are too far away, or because they are insulated by impermeable barriers, thus forming mini-deposits within the reservoirs.

The « new oil » comes from two types of zones on which Esso Rep has carried out intercalary drillings : 17 in 1979, 30 in 1980. The technique of gas injection is to be used on the Parentis field for the first time in continental Europe. The intercalary wells mainly carried out are to be drilled using a new method. Up until now, a concrete platform was constructed for each lacustrine well. The new technique, tested in February 1980 on three wells, means that traditional fixed platforms can be eliminated since drilling is carried out from a mobile floating platform. By increasing the number of extraction shafts and injection wells, Esso Rep. has increased the recovery rate, particularly in areas where the reserves are of average or mediocre quality. Thus, in the calcareous part, which is the least prolific area of the Parentis field, the extraction rate was increased from 6 to 17 %. The average rate for all Esso Rep's fields is 37 %. Studies and work are being continued — a three-dimensional seismic campaign undertaken on the Parentis field will enable further details to be obtained concerning the structure.

At the seam time, Esso Rep is seeking to improve the productivity of its fields by different techniques methods and equipment which have been used little or not at all, up until the present : directional drilling at Lugos, water injection at Cazaux. Long stroke hydraulic pumps were installed in France for the first time during the first half of 1980 on two wells on the Cazaux field. This new activation methods installed on 2 direction wells 2,400 metres deep, gives higher production than that obtained using a beam pump and is better adapted to sites with multiple wells.

This ambitious development program is to be carried out on the 65,000 sq.km. of the Esso Rep's mining area in metropolitan France, some of which were thanks to techniques developed by Esso Rep's Scientific Center at Begles near Bordeaux, which serves as the platform for all Exxon's European research into exploration and production, an other centers run by the world's leading oil company, those of Exxon Production Research in particular, with which Esso Rep works in close collaboration.

Investments devoted to development clearly show the direction of this policy, which corresponds to the objectives expressed by the public authorities within the framework of the French Hydrocarbon Plan : from 23 million francs in 1978, the budget increased to 45 million francs in 1979 and exceeded 100 million francs in 1980.

Jeanine JAQUES

CSO: 3102/291

ELECTRONICS

AEG-TELEFUNKEN EXHIBITS COMPUTER THAT HEARS, SPEAKS

Wuerzburg ELECTRO TECHNIK in German 25 Mar 81 p 5

[Article: "Computer Talks and Listens"]

[Text] With the increasing use of data processing equipment, interest in methods for simplifying the information exchange between man and machine is increasing. Since speech is the commonest and simplest way for man and machine to understand one another, it was logical to use it for communicating with the computer. AEG Telefunken is exhibiting at this year's Hannover Fair a new piece of equipment, the acoustic data acquisition system ADES, with which it has been possible to endow the computer with speech and hearing. ADES consists of a speech input system which recognizes a maximum of 600 words and a speech output system that, for example, as used by the German Federal Railroad for automated information on train schedules, has a digitally-stored 1500-word vocabulary.

Now, how does this speech output system work? By a special analysis program, an analog spoken text is converted into digital data and stored in a nonvolatile memory. A control unit can upon command compose a desired text from individual words, sentences. In a speech synthesizer which functions very much like the human voice the analog speech signal is reconstructed and then conveyed by the speech output device at the usual telephone sound level. In spite of the fact that the speech signal had undergone digital conversion, the speech characteristics of the speaker can still be recognized.

And how does speech recognition work? Recognition of the spoken words rests upon the principle of single-word recognition. It functions similarly to human hearing. The word is analyzed into its frequency spectrum and volume and intonation are also determined. A model is generated from this data which describes the signal as closely as possible. This model is now compared with stored models numbering up to 600 words; sufficiently similar "classes" are paired and a word is considered to be recognized. In a "learning phase" each user of the system produces his "classifier" by repeated enunciation of the recognition vocabulary, and finally the classifier is stored. The storage areas and the number of users can be expanded at will by changing storage disks.

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ELECTRONICS

BRIEFS

ION IMPLANTATION AT AEG-TELEFUNKEN--At AEG-Telefunken a new power ion implantation plant was commissioned suitable for jet currents up to 2 mA in the 20 to 200 kV energy range. Depending on size, a maximum of 104 silicon boards can be implanted simultaneously. In this process, diffusion atoms are ionized and accelerated by an electrical field. Due to their kinetic energy, the ions penetrate the semiconductor substrate, i.e., the silicon board. Compared to thermic diffusion, this process has the advantage that even with utmost ion bombardment, the silicon boards heat up very little and can be structured by means of photo-lacquer masks instead of silicon-oxide masks. [Text] [Wuerzburg ELEKTROTECHNIK in German 16 Feb 81 p 13] 9544

CSO: 3102/230

ENERGY

SWEDISH-NORWEGIAN CONSORTIUM PLANS OIL PLATFORM OF ICE

Stockholm NY TEKNIK in Swedish 19 Mar 81 p 23

[Article by Lars Eriksson]

[Text] A Swedish-Norwegian consortium is planning to build an oil platform of ice. Stal Refrigeration in Norrkoping will be responsible for the refrigeration technology. The first platform will be used in Canada and it is expected to be complete in 1986.

In addition to Stal Refrigeration, the consortium will consist of Aker Engineering and Husebye et Olsen, of which the platform's inventor, Eystein Husebye, is part owner.

Eystein Husebye has thought about this idea for several years and negotiations are now underway among the three companies for financing a preliminary study. It will be complete by this summer and it is estimated that it will cost about 400,000 Norwegian kroner.

The platform will be constructed in the form of an enormous cylinder with a shell of concrete or steel. The diameter will be 250 meters and it will be 60 meters high.

The inner part of the cylinder will be filled with ice and the entire platform will then be sunk at the well site where it will be frozen to the bottom. But how is it possible to freeze such a large volume?

Ice Factory

"One of the most conceivable methods is to place an ice factory above the cylindrical shell," technical director Tore Brandin of Stal Refrigeration said.

"We have, for example, facilities for making tubular ice blocks 50 mm in diameter. Thus, we can fill the cylinder with these blocks, which can then be packed and frozen together. Of course, large volumes are involved, but units are available that can produce hundreds of tons daily."

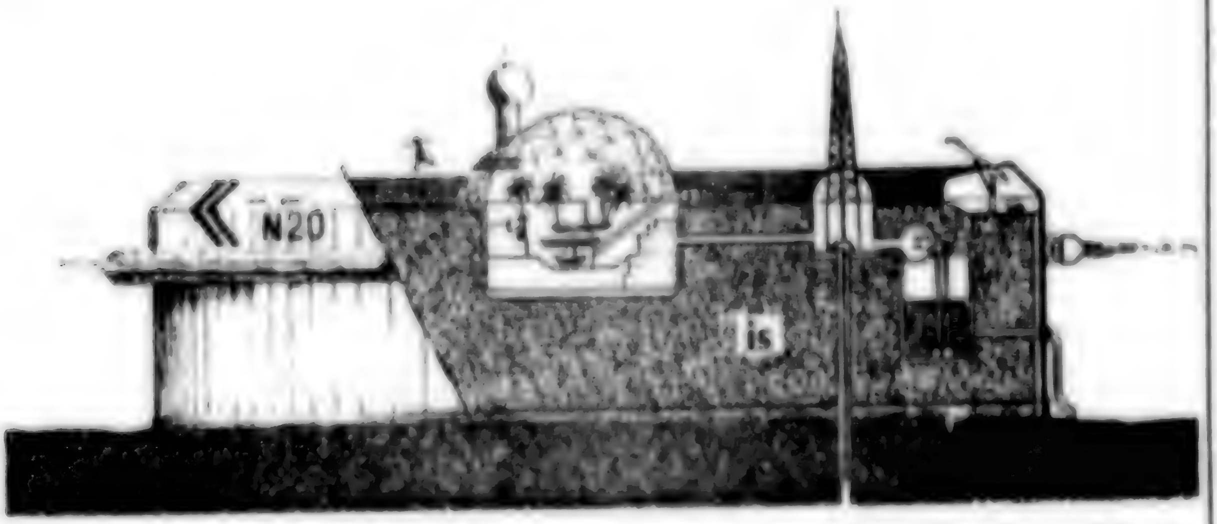
"This platform will have an enormous surface, about 50,000 m^2," designer Eystein Husebye said. "This means that all the equipment needed on the platform can be placed on the same level. Condeep platforms have a surface of about 6,000 m^2

and they require three to five decks on top of one another to have room for everything. We will save much material with this platform, which makes it considerably less expensive."

"The living quarters, however, will be placed within the ice. Arctic conditions are present at the proposed site of the first platform. This means temperatures of minus 40° C and strong winds. Under these conditions, the living quarters must be protected.

Eystein Husebye also believes that this type of platform could be used in the North Sea.

"In Canada, to be sure, the water is only 60 m deep and in the North Sea it is about 100 to 200 m, but this will be no problem," he said. The North Sea also has one advantage over the sea around Canada. Here there is no pack ice that can cause problems for the platform. The idea for this type of platform is already patented in most Western countries.



Den cylinderformade plattformen får ett skal av betong eller stål. Den fylls sedan med is som kommer att omge bostadsutrymmen, produktionshål och pumpanläggning.

The cylindrical platform will have a shell of concrete or steel. It will then be filled with ice, which will surround the living quarters, the well, and the pumping facilities.

9336
CSO: 3102/241

SWEDEN'S WIND POWER PROGRAM CONTINUES ON MORE HOPEFUL NOTE

Stockholm NY TEKNIK in Swedish 26 Mar p 14

[Article by Mikael Holmstrom]

[Text] The wind power plants in Maglarp in Scania and at Nasudden on Gotland will not be the unsuccessful local phenomena that the first wind power plant in Kalkugnen was--at least not with respect to the wind. This has been shown by 14 month wind measurements at the construction sites.

The wind power plant at Kalkugnen in Uppland, which was a test unit, was a disappointment. There was simply not enough wind.

From the start in 1977 until 1980, when a hoisting crane accident destroyed the power plant, various blades and hubs were tested.

The power plant had few hours of actual operation, however. It was to begin operation at wind speeds of 5 m/s, but the average wind speed was only 3.6 to 3.7 m/s.

One of the lessons learned at Kalkugnen is that the terrain and vegetation near the power plant affect the wind more than previously believed.

For the large power plants now being built at Maglarp in Scania and Nasudden on Gotland, wind researchers have indicated that they should be designed for 8 m/s at 100 m above the ground.

Since the Board for Energy Production Research (NE) ordered the power plants, this is also the figure assumed by the designers.

Now 14 months of wind measurements by the National Meteorological and Hydrographic Institute have shown that this time the theories are in agreement with reality.

At 100 m, winds in Maglarp blow at 8.7 m/s and in Nasudden they average 7.6 m/s. According to all parties involved, it is too early to draw positive conclusions from the 14 month study, but all indications are that the final figures will deviate by no more than 9.5 m/s from the previous results.

The somewhat higher figures in Maglarp may result from unusually windy weather in 1980. The figure is somewhat lower in Nasudden. This may be because the power plant there will be farther inland than NE originally had hoped.

Work on the foundation has been underway there just under a month. The power plant could not be built closer to the sea because the landscape there is protected.

NY TEKNIK has found out that if the Nasudden figures are correct, energy production will be 90 percent of the originally calculated value.

In November of this year, the first of the two power plants will be connected to the Sydkraft grid in Maglarp.

The wind velocity in Maglarp is the same as that measured in Goodnoe Hills, Oregon, in the United States. There the American Department of Energy is completing a facility for three power plants this year. They have 92 m turbine diameters and a power of 2.5 MW each.

The Swedish power plants have turbine diameters of 80 m and a generator output of 3 MW. Next year, when the break-in period is complete, it will be possible to see if the designers have succeeded in producing the number of kilowatt-hours predicted in theory. In the case of Maglarp, this means a production of 8.2 GWh/year.

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CSO: 3102/241

RHEINBRAUN OFFICIAL OUTLINES PLANS FOR COAL CONVERSION

Bonn DIE WELT in German 17 Mar 81 p 11

[Article by Jens Farrell: "Nuclear Power Makes Brown Coal the Star of Energies"]

[Text] "We wish to establish a basis from which we can decide on the optimal use of brown coal, depending on the current situation regarding energy policy and the resulting economic issues."

This is how Dr Engr Peter Speich, member of the board of Rheinbraun, formulates the efforts and aims of this company to make brown coal an important crude oil and natural gas substitute beyond its utilization as a supplier of electrical power in the decades to come.

The preconditions for refining brown coal are favorable due to its particular raw material characteristics. The minable deposits in the Rhine district between Cologne and Aachen will last for another 300 years and grossly correspond to the energy content of the Iranian oil deposits.

For the new role of brown coal, the Cologne company drafted a long-term, three-stage program which utilizes the technical experience of its subsidiary, Union Rheinische Braunkohle Kraftstoff AG in Wesseling.

As an initial area of concentration, Rheinbraun further developed the Winkler fluidized-bed gasification process. The purpose is to produce synthesis gas from brown coal, which can be used by the chemical industry and for the production of hydrogen. The plans for construction and operation of the demonstration stage of a plant for the production of synthesis gas have been completed and approved.

The first stage of this gasification plant is to take up operation in 1983/84. Under full utilization of the plant scheduled for 1987, some 1 billion m^3 of synthesis gas could be produced from brown coal, transported by pipeline to Union Kraftstoff in Wesseling and converted into methanol. Peter Speich, responsible for Rheinbraun's research and refinement, says, "Extending our product range on the basis of methanol appears to be quite feasible, including the production of gasoline in the course of further conversions."

The second area of concentration of the Rheinbraun coal research is the production of artificial natural gas. Here, the refined technology of fluidized-bed gasification is utilized. The gasification medium is hydrogen.

With this process, an extremely high methane content is achieved in the raw gas. The first pilot plant for the production of artificial natural gas from brown coal has been in operation on the Union Kraftstoff premises in Wesseling for several years. The next larger plant stage is under construction and will feature a daily consumption of about 600 tons of brown coal.

In this process, the required hydrogen can be supplied by conventional or nuclear methods. Using the conventional method, a brown coal power plant is suitable, and for the nuclear method the process heat of a high-temperature reactor is suitable.

"Our program includes the construction of a conventional pilot plant by the end of the 1980's," explains board member Speich. "It is to have an annual capacity of 1 billion m^3 of artificial natural gas." The nuclear plant could follow at a later date, depending on the state of the art of high-temperature reactor development. Some 40 percent of the coal used would be saved.

The third area of concentration in Rheinbraun's research and development program is hydrating liquefaction, i.e., the production of gasoline and medium oil from brown coal.

Coal liquefaction on a large scale was practiced at Union Kraftstoff as early as World War II. The process used then is now further developed for operation with lower pressure (300 bar instead of 700 bar formerly) and increased efficiency.

An engineering school plant is in pilot operation in Wesseling. By connecting a pilot plant as an intermediate stage at Rheinbraun, this technology is to become available on an industrial scale by the early 1990's. The capacity of such a pilot plant could be around 500,000 tons of gasoline and medium oil per year.

But as good as plans and programs may look--one important prerequisite in all deliberations remains the fact that if larger quantities of brown coal are used for gasification or liquefaction, part of the electrical power now generated by means of brown coal will then be generated by nuclear energy.

9544
CSO: 3102/230

SIEMENS RESEARCHES CHEAPER SOLAR CELLS

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 29 Apr 81 p 5

[Article: "Amorphous Silicon for Low-Cost Solar Cells"]

[Text] Siemens AG, Munich/Berlin. Polycrystalline silicon is unrivaled as a starting material for many electronic components; however, photovoltaic solar cells made from it are presently much too expensive to make a significant contribution to the world's energy supply. Hopes are thus focused on amorphous silicon which may make it possible to reduce the price of solar cells from today's $50 per watt to $.50 per watt, according to Siemens.

As with crystalline silicon, the critical n and p junctions can also be produced by doping the hydrogen-containing amorphous silicon. The basic material can be produced at a reasonable price with low energy expenditure by the glow discharge process which decomposes the silicon hydride. The resulting amorphous silicon offers efficiencies of 10 to 20 percent and could provide the impetus for other semiconductor developments. New thinfilm transistors (TFT) are already contemplated. According to company reports, cell efficiencies achieved to date in the Siemens research laboratory are about 5 to 6 percent.

In the case of the glow-discharge process researched by Siemens, thin silicon films with a thickness of 1 micrometer can be produced which make the cost of the solar-cell semiconductor itself less than the cost of the substrate.

Siemens is also involved with the production of cheap substrates made from steel sheet and plastic foils which are suitable for use as tapes. The company believes it can produce with amorphous silicon photovoltaic solar cells for large-scale use which are up to a hundredfold cheaper than those produced to date with single-crystal silicon. The price and efficiency of these cells would then make possible competitive energy production costs. The accompanying picture from Siemens research laboratories shows a 1-micrometer thick solar cell on a glass substrate.

9160
CSO: 3102/271

GEOTHERMAL DEVELOPMENT EXAMINED IN COUNCIL OF MINISTERS

Paris AFP SCIENCES in French 2 Apr 81 p 6

[Text] Andre Giraud, Minister of Industry, who delivered a paper dealing with geothermal development to the Council of Ministers on 1 April, indicated that 15,000 dwellings in France are now being heated by geothermal means and that work now being performed will permit installing this type of heating system in an additional 70,000 dwellings.

According to the minister, this achievement was made possible by "the policy conducted for several years which permitted removing the obstacles that opposed the advance of this new form of energy."

1. The legal framework intended to facilitate operations was established by the law dealing with the use of heat and saving of energy as well as revising of the mining code.

2. A particularly motivating incentive, involving subsidies and low interest loans, was established. It has just been modified and completed and consists of the following elements:

A subsidy of 30 percent of the cost of preliminary drilling.

Insurance of geological risk for an additional amount equal to 50 percent of the cost of preliminary drilling.

Insurance of long-term mining risk (against disappearance of the deposit of hot water within 10 or 15 years) by means of a mutual fund furnished by the government.

The goal set for the year 1990 is the use of geothermal heat in 1 million dwellings.

With regard to "high energy" geothermy (employment of very high temperature water or steam), the resources of the overseas departments and territories will be evaluated, particularly at the meeting in Guadeloupe where the Bouillante electrical power station will begin furnishing service in 1983. This construction and these projects will favor exportation of our techniques to the international marketplace. The Minister of Industry also furnished an account of the status of research dealing with the exploitation of bituminous schists. Only an underground technique that will not endanger the environment and which is presently being employed will be conducted.

In this regard, the government exercised a definitive veto against the plan for exploiting the deposits of bitiminous schists in the quaries of Fecocourt (Meurthe-et-Moselle).

7619
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BRIEFS

SOLAR VILLAGE BUILT--Melun--Michel d'Ornano, minister of the environment and quality of life, on 7 April unveiled a solar village built at Nandy in the new city of Melun-Senart. This village consisting of 19 houses was built by the winners of the "competition of 5,000 solar houses." It is a European "first" because it is the first time that so many different models of solar houses are grouped in the same place. These houses will not be occupied for 18 months; before that they will be exhibited as examples of solar housing. The village of Nandy, d'Ornano stated, is the point of departure for the first solar construction operation in accordance with two objectives: between now and 1985 for 10 percent of all new housing built in France to be solar and, starting in 1985, for all new houses to be bioclimatological. [Text] [Paris AFP SCIENCES in French 9 Apr 81 p 27] 11706

METHANIZATION OF AGRICULTURAL WASTE--LE MANS. Inauguration of an industrial plant for producing energy by methanization of agricultural wastes. An industrial plant for production of energy by methanization of agricultural wastes and residues of food industries was inaugurated on 31 March at Saint Symphorien (Sarthe) in the presence of Henri Durand, president of the Solar Energy Commission (COMES). The industrial conversion plant, supplied exclusively with liquid hog manure but intended to process the pumpable wastes produced by all the types of animals bred at the Sanders agricultural station, produces a volume of 350 to 400 cubic meters of biological gas per day, including 67 percent of methane. This plant is designed to provide complete energy independence for an operation of 3000 hogs whereas present individual installations can only meet the needs of small establishments (500 to 600 hogs or 30 to 40 bovines). According to Mr Durand, it was believed in 1976 that methanization of animal and vegetable wastes contributed the equivalent of 63 million tons of petroleum to the world's energy requirements, 93 percent of which was supplied by the developing countries. [Text] [Paris AFP SCIENCES in French 2 Apr 81 p 26] 7619

CSO: 3102/265

ENCOURAGEMENT OF FLEXIBLE WORKSHOPS YIELDS SOME RESULTS

Paris L'USINE NOUVELLE in French 14 May 81 pp 99-101

[Article by Georges LeGall: "Flexible Workshops: The PMI Will Realize Them in Stages"]

> [Text] Pilot operations have been started, financial inducements exist.... But the introduction of flexible workshops among the PMI [small and medium-size manufacturers] will take place only slowly, first of all because of their cost, and in addition because they presuppose great changes in production organizations. The stakes justify the pains.

For French flexible workshops a start has been made. The installations already in operation (Caterpillar at Echirolles, near Grenoble, since the end of 1980); those under construction (start-up this year at Renault Vehicules industriels [Renault Industrial Vehicles] at Boutheon, near Saint-Etienne, as well as at Jaeger at Mondeville, near Caen); and those for which starting dates have been fixed (Ernault-Somua of the Empain-Schneider group, at Moulens, in 1982; Cycles Peugeot at Dannemarie, in the department of Haut-Rhen, in 1982; Citroen at Meudon in 1983; Alsthom-Atlantique at Orleans in 1983; Aerospatiale at Bourges in 1984; and Sima, of the Valeo group, at Saint-Etienne in 1984) involve large enterprises or companies connected with powerful groups.

However, medium-sized and even small enterprises are also starting to contemplate exploiting production processes of this kind. Such is the case at Les Touches (department of Loire-Atlantique); SAHL (actuators, 180 employees); Hagetman in Landes, with four enterprises producing wood furniture (chairs and parlor suites); Begue (200 workers), Copdevielle (500), Dandignon (150), and Lonne (160); at Villeurbanne, with Termoz (90 workers, engaged in mechanical subcontracting); at Morlass, near Pau, with MAP, which employs 43, in aeronautical equipment; at Saint-Midard-en-Jalle, near Bordeaux, with Sari (40 workers, in sheet metal work); and at Saint-Etienne, with Hoffmann, also in aeronautical subcontracting with 10 employees.

Production Time Will Be Reduced by 30 to 40 Percent

Although automated flexible workshops have been in use very much in France for a year, that is, since the beginning of 1980 when the CODIS [Strategic Industries Development Commission], established by the government, called for bids to promote completion of pilot operations, this was not to follow a trend but rather out of concern for economic efficiency. Thus, in speaking of the shop at Meudon, which will manufacture prototype parts (crankcases, cylinder heads, etc.) intended for the studies bureau, Pierre Nicoleau, director of the mechanical construction division of Citroen, states: "Production time will be reduced by 30 to 40 percent in comparison to what was possible with conventional processes; costs will be about 25 percent lower and quality will be superior."

The automated flexible workshops, which will make use of numerically controlled machines interconnected by materials handling robots and coordinated by a computer, indeed makes spectacular productivity gains possible in the manufacture of small and medium-size production runs.

Renault and Ernault-Somua, the two leading French producers of machine tools, are already working on 15 and 6, respectively, flexible workshop projects.

Nevertheless, one must be aware of self-delusion: flexible workshops are not magical devices capable of cheaply and quickly solving all problems of competitiveness. In addition, the existing projects in France are not for finished products but rather for some of their components: transmission housings, alternator parts, washing machine tanks, lathe headstocks, etc. The number of workers involved is modest: for example, 18 work stations per shift in Citroen at Meudon (instead of 54 with conventional equipment).

In spite of that the investment is great: several tens of millions of francs for an installation built from scratch. And in such a case it is a lengthy process: 2 to 3 years from the "green light" to start of operations because, before investing in machines, an investment in grey matter must be made; thus, 20 engineers of the general contractor company (Automatique Industriele [Industrial Automation], subsidiary of the Societe Generale de Peugeot et de Rhone-Poulenc, and of Citroen, will have worked during the entire first half of 1981 on the Meudon project.

This is why the government authorities wanted pilot operations receiving CODIS aid bring customers and engineering together. The objective, in particular, was to be able to apply their studies to later construction. For example, the shopbuilding of Citroen at Meudon was selected for conversion to PMI manufacturing parts in small production runs. Likewise, the Option engineering firm (subsidiary of La Telemecanique), during the study phase which will last a year, is not only going to examine the "feasibility" of flexible workshops in the four enterprises at Hagetman, but also, at the same time, to work on a market study of possible outlets for the type of equipment in the whole woodworking industry.

In addition to pilot operations, Public Works has recently instituted financial incentives which concern the PMI as well as large enterprises. They are applicable to all the equipment which further the development of and therfore, in particular, to the elements which constitute flexible workshops, such as numerically controlled machine tools, materials handling robots, computers, etc.

The objective is to facilitate investments by customers as well as by producers of such equipment. All businesses, whatever their size, are eligible for reduced rate loans (the reduction is 3 percent, that is, 1 percent more than for funds customarily provided by the National Credit Bank, Regional Development Companies and PME Equipment Credit Bank). They are called "loans for robots," for which the government has authorized a first installment of 1 billion francs; the files are under the jurisdiction of the CODIS but may be forwarded by the 17 interdepartmental directorates of the Ministry of Industry.

All the businesses producing the equipment in question may conclude development contracts with the CODIS. In addition, the MECA (machines and equipment of advanced design) regulations, which are restricted to businesses with fewer than 1,000 employees, make it possible, with an extensive list of equipment items, to have the benefit of advantages which, up to 1980, were limited to the first acquisition of a numerically controlled machine tool. Such benefits include technical assistance, a trial period with the option of returning the item to the supplier, and a subsidy of from 4 to 25 percent of the machine's cost. Supervision of these MECA regulations is provided by ADEPA (National Agency for Development of Automated Production) and the first funds available for 1981 amount to 60 million francs.

The financial effort to which the government authorities have agreed is indeed notable. But the main part, obviously, remains the responsibility of the enterprises. And the PMI, even the most dynamic, are up against the lack of understanding in banking circles: "Bankers know how to read balance sheets but do not know how to appraise the profitability of an investment," states Raymond Courville, head of MAP, with bitterness. His enterprise already has at its disposal seven numerically controlled machines (two more will be added this year) and a three-dimentional gauging machine (soon to be computer guided) acquired for the quality assurance which will make supply contracts with Boeing possible. "Yes, I dream of attaining the flexible workshop stage but do not have the necessary money," Raymond Courville avows.

The Flexible Workshop Will Not Be Created From Scratch

And Joel Teduc, head of Sahl, says bluntly: "There is much glib talk as far as public assistance is concerned." There is indeed a great deal of progress needed to improve relations between the PMI and credit organizations; ADEPA is devoting attention to it.

Whatever the case, "within the PMI the flexible workshop will not be created from scratch," says Gerard Lmbert of ADEPA. Because of cost, certainly, but also because that presupposes profound changes in production organization. ADEPA therefore proposes to end up with flexible cells in three stages:

--organizing production into manufacturing islands. The backlogs are reduced and the useful time ratio of each work station is increased;

--automation and data processing. Putting advanced design machines into service (numerically controlled, programmable automations, etc.) improves productivity. Computerizing production control enables rapid adaptation to variations in the nature and quantity of manufactured items; and

--"robotization." Recourse to robots to feed the work stations accelerates passage from one set of operations to another. A system of mechanized conveyance of parts makes connections between the elements of an island or among the various islands more flexible. Guidance of the entire flexible cell in real time implies an increase in the computer's capacity.

Where does the flexible cell end and the flexible workshop begin? In this new area, as in that of robots, definitions remain blurred. Moreover, it is not evident that all enterprises are interested in passing through all the stages. Thus, the directors of Termoz already have available 20 numerically controlled machines--(and the acquisition of 20 more in the next 3 years is planned)--including several connected to a computer: they indeed have flexible cells; they are studying the questions of the extent to which it is desirable to interconnect the machines, taking into account the fact that they are subcontractors (some contracts may have only a rather short life) and that their outlets are highly varied (automobiles, weapons, public works equipment, etc.).

In fact flexible workshops are only one of the aspects (along with robots, computer assisted design, etc.) of production process automation (in mechanical industries, and also in textiles, agriculture-food, etc.) whose common characteristic is the intensive recourse to electronics in order to improve productivity,

Flexible Workshop Projects

Committed

Company	Location	Utilization	Investment	In Service
Caterpillar	Echerolles (near Grenoble)	Loaders	42 million francs	1980
Jaeger	Mondeville (near Caen)	Dashboards	5 million francs	1981
Renault Industrial Vehicles	Boutheon (near Saint-Etienne)	Transmissions	45 million francs	1981
Cycles Peugeot	Dannemarie (near Saint-Louis, Haut-Rhin)	Transmissions for motorized bicycles	20 million francs	1982

Company	Location	Utilization	Investment	In Service
Ernault-Somua	Moulins	Lathes	40 million francs	1982
Alsthom-Atlantique	Orleans	Alternators	37 million francs	1983
Citroen	Meudon (Paris suburb)	Motors and transmissions	32 million francs	1983
Aerospatiale	Bourges	Tactical missiles	26 million francs	1984
Sima (Valeo group)	Saint-Etienne	Motorized cranes	90 million francs	1984

Under Study or Planned

Company	Location	Utilization	Investment
Begue* Capdeville* Daudignon* Lonne *	Hagetman (Landes)	Wood furniture components	4 million francs
CIT-Alcatel	Annecy	Pumps	
National Engineering School	Saint-Etienne	Instruction	4 million francs
Hoffmann	Saint-Etienne	Aeronautical equipment	
Lervy-Somer	Angouleme	Motor-reducers	
MAP	Morious (near Pau)	Aeronautical equipment	
RCS	Mulhouse	Elevators	
SAB (Volvo group)	Amiens	Railway brakes	
SAHL	Les Touches (near Chateaubriant, Loire-Atlantique)	Actuators	
Sari	Saint-Medard-en-Jalle (near Bordeaux)	Sheet metal work	

*(Four enterprises with a joint project)

Company	Location	Utilization	Investments
SCEMM (Citroen)	Saint-Etienne	Machine tools	
Termoz	Villeurbanne (near Lyon)	Mechanical subcontracting	
Thomson	La Roche-sur-Yon	Dishwashing machines	

One cannot claim to draw up an exhaustive list of flexible workshops because several large enterprises (Matra, Renault, La Telemecanique, etc.) which have projects consider it too soon to specify the installation locations, dates of entry into service, etc. And it is impossible to count all the PMI already committed to automation and which are capable of reaching the flexible workshop stage. In spite of all that L'USINE NOUVELLE is the first to compile this list of flexible workshops in France; a first rough outline which is merely a documentation.

11706
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INDUSTRIAL TECHNOLOGY

PROJECT AIMS AT CREATION OF ROBOT WITH SIGHT, TOUCH SENSE

Milan L'UNITA in Italian 11 May 81 p 8

[Article by Carlo Arcari: "Third Generation Robots"]

[Text] The third generation robots are arriving. They are machines equipped with artificial intelligence capable of communicating with the outside world, as opposed to the robots used by our industry for the past several years. They take in and use all sensory information new technologies allow them to receive. In Milan, in the electronics department lab of the Politecnico, a working group headed by Professor Somalvico has worked for years on the "Supersigma" project to equip a "Sigma" robot with sight and touch capabilities. The "Sigma" robot is built and used by Olivetti in its plants.

The jump from "Sigma" to "Supersigma" is enormous. The former performs its tasks in perfect fashion, but the conditions and the positions of objects to be handled, as well as their size, must remain constant. It is not able to recognize an altered situation and cannot act accordingly. The latter unit, on the other hand, is equipped with vision and tactile sensors which enable it to recognize the piece requiring handling from others of different shapes.

This project, which will soon come to a close, is about to be joined by another research project about to commence at the CNR-LADSEB of Padova, where they are waiting for the delivery of a "Puma." A place of honor has already been set aside for it in a chamber of the bioengineering systems dynamics laboratory. "Once it arrives we will finally be able to put into practice all the simulation work we have performed over the years" said Prof Enrico Paganello, to whom the machine will be entrusted. "With the 'Puma', we will attempt to integrate visual and tactile functions with motor ones." The "Puma" we are speaking of is neither a feline nor does it come from the wild Wyoming mountains. UNIMATION, Inc., which is the United States largest robot manufacturing firm, baptized its most successful manipulating robot with this name, reminiscent of an image of strength and agility.

It is an automation that has an almost anthropomorphic shape of a human arm, ending with a wrist and a three-fingered hand used for grasping. Very useful for assembly, in the United States it is used in the automobile industry, for example, where it is replacing workers on the assembly lines in significant numbers. With its three fingers it is even capable of handling tools and utensils.

In short, it is a perfect blue-collar worker. Professor Paganello's "Puma" is the first one purchased by the CNR on an experimental basis and the small group of researchers in Italy interested in robots hopes this will be the first step toward constituting a full project which presently forms a lacuna. It is the factor of initiative (as is often the case) that sets the pace with regard to research, although Italy enjoys a position of some importance in the field of robot production.

It was recently learned that Olivetti may want to open a research center at Palo Alto, in California. Italian universities that host robot research departments, in addition to Padova and Milan, include the universities of Bologna, Genova, Rome and Turin, which however, taken together, do not amount to much when compared to the center opened at the Carnegie Mellon University of Pittsburgh, financed by Westinghouse to the tune of 5 million dollars. A finalized CNR robot project could help keep the inevitable gap for our country from turning into a bottomless chasm.

9209
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INDUSTRIAL TECHNOLOGY

CERAMIC CUTTING TOOLS WILL SEE MORE USE IN FUTURE

Paris L'USINE NOUVELLE in French, supplement Apr 81 pp 150, 151, 153

[Article: "Users Speak: Ceramic Cutting Tools"]

[Text] Ceramics offer much higher cutting speeds and shavings outputs than other cutting tools, making it possible to machine very hard metals and often eliminating the need for adjustments. While there use is still limited because they require high power machinery, it should increase with the appearance of new machine tools which will be much more productive.

When ceramics entered the cutting tool market over twenty years ago, they contributed revolutionary machining characteristics. However, their development has been hampered because the old fashioned machine-tools have been unable to cope with cutting conditions. But ceramic cutting tools are getting a new start because better performing machines are becoming available, usually with numerical controls, and eventually mounted on concrete pedestals or benches (Sculfort, George Fischer, and so on). At the same time, the two types of products, white and black ceramics, have been extensively developed.

Concerning their properties during use, the differences between the two groups of cutting ceramics can be summed up as follows: white ceramics are more resistant to high temperatures and therefore allow higher cutting rates. Black ceramics, known as cermets, have better wear resistance and better resistance to thermal and mechanical shock. It must be added, however, that manufacturers have constantly improved the strength of white ceramics, so that these are now taking over some of the applications of cermets. Widia has even announced the upcoming introduction of a new generation of white ceramics which ought to replace cermets. It may also be said, for example, that if carbides machine gray cast iron at 220 m/mn, the corresponding cutting speeds would be 440 m/mn for cermets, and 750 to 1400 m/mn for white ceramics.

Ceramics are essentially meant for use to machine ferrous materials: all cast irons, gray, malleable, GS, and even white cementite-structured types; and all common types of steel, even treated ones, with the exception however of certain austenitic steels.

For reasons of chemical affinity, they are not suited to machining light alloys. But their main area of utilization is the mass production machining of gray cast iron, for rough and finished cuts. The applications are numerous in the automobile industry: flywheels, clutch plates, brake disks and drums, belt pulleys, and so on.

For harder cast irons (400 to 600 brinell), ceramics provide cutting speeds four to five times greater than those of carbides, with surface finishes which are at least equivalent. There are several examples of utilization on steels, for both groups of ceramics. They most often involve special processed steels or steels which are case hardened and processed to great hardness, and for which ceramics have made it possible to considerably reduce machining time.

There is another application for steel machining, this one involves no lathing or milling, but a planing operation on the exterior bead of continuously welded tubing (Vallourec). The bead is removed immediately after welding, in other words at a temperature of the order of 800 to 900 ^{0}C, at a moving speed of 120 to 130 m/mn. The blade is of white ceramic, square shaped, with convex sides to match the tubing radius. At a cutting rate of 120 m/mn, each edge can cut for one hour.

The Tool Preceded the Machine

To obtain the high cutting speeds announced by the ceramics manufacturers, machine-tools must of course be capable of operating at these speeds. The result is that ceramic machining requires high power machines: three to four times higher than for carbide use. In fact the machine-tool problem is what slowed down the development of ceramics applications. Guy Haber, at Feldmuhle, noted that "in the matter of performances, the tool has preceded the machine." Henri Gargaud, at Ceraver, echoes this when he says: "The development of ceramics has been hampered by the obsolescence of available machines."

Because they are fragile, ceramics do not withstand shock, which means that machine-tools must be entirely stable, heavy, free of imbalance and vibrations. While in demonstrations many builders show machine-tools operating with ceramics, in practice, optimum conditions of use do not always appear to be all present.

Some users have had to completely transform their machines (for example by adding vibrated concrete pedestals). For specific applications requiring very high shavings outputs, others have ordered special machines which require lengthy adjustments and some of which are not yet in operation. However, for optimum utilization of cutting ceramics, machine-tools are not the only things in question. Their high cost can be justified only if they are put to profitable operations, or in other words operations which are simple and of relatively long duration, this being the only way to derive advantage from the high cutting speeds which are the primary value of ceramics. The time thus gained is worthwhile only if the work area is judiciously planned to ensure maximum cutting time. In addition, the parts must be balanced so that vibrations are not introduced in the spindle. It is therefore appropriate to reconsider the shape of parts, the machining rates, and the conditions of utilization in order to eliminate nonproductive time.

Aside from their technical characteristics, ceramics are likely to provide a solution to the problem of high performance cutting tools in cases where raw materials supplies might become a problem. Carbide tool components are strategic materials: tungsten, tantalum, titanium, and even cobalt are produced in countries with which trade relations are particularly precarious. Export stoppages could have very grave consequences, leading notably to the stoppage of weapons manufacturing. The situation has not come to that yet, but there has already been a very noticeable increase in the cost of these materials (400 percent for tantalum!).

By contrast, alumina, which is the basic component of cutting ceramics, is one of the most widely found materials in the earth's crust. Although there can be no question of total substitution, it is conceivable that development of ceramics applications--requiring progress in the machine-tool field and a new concept for parts design--could help toward freeing machinists from economic and political constraints.

At present, ceramic tool sales amount to only some 4 percent of the sales of carbide tools (maybe less, in the opinion of Robert Geslot, head of cutting operations at Cetim). Research being conducted by ceramics manufacturers may therefore open a considerable market for them, whenever the optimum utilisation conditions for these products have been met.

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CSO: 3102/263

SYSTEM TO CONVERT NC MACHINES TO DNC DEVELOPED

Paris L'USINE NOUVELLE in French May 81 p 8

[Article by Claude Gele: "Machining: One More Step Toward DNC"]

[Text] Most French numerical control machines on order are of the hard-wired type. It is imperative that they be modernized in order to progress to the Direct Numerical Control step (DNC) and thence to the flexible production unit. ADEPA [Agency for the Development of Automated Production] is involved in this activity and will soon present its "Micro-Adapt."

How can hard-wired numerical control machine tools be modernized, linked to a central computer through direct numerical control (DNC), and finally made into flexible units operated by a robot? It is to answer this industrial problem that ADEPA has just announced the development of a microprocessor-based programmable adapter associated to a direct numerical control software package. This new development shows the current tendency to reclaim old hard-wired numerical control equipment (NC). In a French inventory evaluated at 6000 machines, 30 percent are installed in small and medium size businesses, and 60 percent operate with old hard-wired equipment. Two other companies (General Electric with Microstore, and CECN Industrie with Micro-CNC) have assessed the market and are already offering systems to convert NC's to computer-driven numerical control (CNC), with all the advantages offered by computers: possibly of program changes and filing of data into memories limiting wear-out problems and paper-tape reader down-time.

Labelled Micro-Adapt, the new system will be displayed next September at the Hanover Fair and will sell for about 46,000 francs, software included. It will be manufactured at the rate of about 35 to 40 a year by a young company in Metz: the Company for the Development of Automated Production (SODEPA). Just as CECN Industrie in Villeurbanne had its origin in the INSA [National Institute of Applied Sciences of Lyon], this is another example of a business derived from a university. Claude Pierron, one of the founders who will leave ADEPA next June to join SODEPA explains: "The design work on Micro-Adapt was done at the Nancy CUCN, a research center associated with ADEPA. The importance of the potential industiral market led us, along with Professor Michel Veron and two Nancy ex-students, to create a micro-electronics firm to manufacture and market this equipment with the approval of ADEPA, which is providing 10 percent of the SODEPA funding. The end objective of ADEPA is to assist users of numerical control equipment in achieving flexible automation. "The future is with the association of machine-tools and robots controlled by computers to make up flexible production mini-cells," states Charles Gauberti, manager of the Automation, Micro-electronics, and Robotics department at ADEPA.

The first step in this process is Direct Numerical Control (DNC). A DNC system can be used to control a group of NC machines, using a computer. Hard-wired NC's cannot be connected to such a system. They must first be converted into CNC's using a programmable interface, a DNC connection, and a modification of the base software. This is what Micro-Adapt will do. Designed around a Motorola M6800, it includes an interactive keyboard and a 32-character display. It is connected to the CNC's paper-tape reader, to the machine-tool, and finally to the DNC computer. The memory size is 16 K and can be extended to 48 K. The DNC software, labeled Dialog, may be used on the ADEPA's automatic programming system and is a part of the PACMECA range of computer-based design and manufacturing systems developed by this company.

Besides the system which will be displayed at Hanover in the booth of the Num Company, which will market Micro-Adapt and will develop its own DNC system, ADEPA will also market another type of equipment to be used on a GSP milling machine with a flexible machining cell. The cell will also include an HES 600 lathe with a Num 450T CNC, a SAGEM Preci-Mill milling machine, and a robot which could also be equipped with a Micro-Adapt. The system is driven by a SEMS Solar 16-65 computer.

"We are already preparing for the final step, which will be the integration of a measurement operation performed in real time by the DNC" states Claude Pierron, who has already developed the software for the Renault-SEIV three-dimentional automatic measurement machine at ADEPA. The objective will be to determine the reference dimension on a part using a feeler which will take the place of the first tool. "It is a critical problem to lock large parts on the machining beds, and it is also one of the keys to the success of flexible workshops."

6445
CSO: 3102/275

RESEARCHERS STUDY FLOW MECHANICS FOR PRACTICAL APPLICATIONS

Cologne DFVLR NACHRICHTEN in German Feb 81 pp 15-20

[Excerpts] Cryo-Wind Tunnel Technology

In order to guarantee the competitive capability of German and European industry for the future, the DNW (German-Dutch Wind Tunnel) was built for the subsonic velocity range and was placed in operation in 1980. This wind tunnel has been set up in the northeast polder in Holland and is being operated jointly by the DFVLR [German Research and Development Institute for Air and Space Travel] with the corresponding Dutch organization, the NLR (National Air and Space Travel Laboratory). Europe does not have an installation for the trans-sonic and supersonic speed range which is urgently needed. Because the costs of a wind tunnel of that size cannot be handled by one country alone, planning is underway currently to build an ETW (European Trans-Sonic Wind Tunnel) which is to be erected and operated jointly by the FRG, France, England, and Holland. Germany has suggested that the ETW be built at the DFVLR research center in Cologne-Porz. The ETW is being planned as a so-called cryo-tunnel, that is to say, nitrogen, the flow substance [agent] is cooled down to about 120 K. This makes it possible to achieve the necessary high Reynolds number with justifiable economic expenditure.

The flow mechanics research sector is conducting comprehensive investigations with the goal of preparing reliable basic designs for the ETW (see F. Maurer, G. Viehweger, W. Lorenz-Meyer, "Studies of the DFVLR in the Field of Cryo-Wind Tunnel Engineering," DFVLR-NACHRICHTEN No 31, November 1980, pp 8-12). Nitrogen evaporation and condensation problems are being taken up in this connection, measurement techniques are being developed for flows at low temperatures, and in a model tunnel, geometrically similar to the ETW, being used as test rig, investigations are being conducted on the quality of the nozzles, the diffuser flow, and the guidance [deflection] corners. A team, established by the BMFT [Federal Ministry of Research and Technology], is coordinating German activities in industry and DFVLR in the new field of cryo-wind tunnel technology. Initial agreements on joint research projects have already been entered into between NASA and DFVLR.

The low-velocity wind tunnel in Cologne-Porz has furthermore been converted to cryogenic operation in order to gain experience in wind tunnel models of the same size, as they are to be used later on in the ETW, although at lower speeds, and to enable users to adjust to ETW operation rather early.

Aeroacoustics

DFVLR is involved to a lesser degree in the "Research on the Interface Between the Wheel and Rail System" BMFT Technology Program. Here, the German Federal Railroads and the Wheel/Rail Research Community have selected a blueprint of a low-resistance locomotive bow shape for the planned experimental vehicle on the Rheine-Freren (Emsland) run, which had been computed and experimentally checked out in the FB-SM [Research Sector for Flow Mechanics]. Because in the case of conventional trains, the air resistance at 350 km/hr can amount to about 95 percent of the running resistance, the reduction of the resistance is of great importance for the sake of economical operation. High train speeds are connected with loud noise development. Before one can propose effective noise reduction measures, one must locate the noise sources and the mechanisms involved in their origin must be identified.

In the course of an experimental investigation, on the high-speed segment of the German Federal Railroads at Oelde, Westphalia, two different directional microphone systems, developed by the Institute of Experimental Flow Mechanics, were used at train speeds of up to 250 km/hr. Figure 6 shows experimental locomotive no 03, passing the microphone array. The signals are recorded on magnetic tape so that, during a subsequent analysis, it will be possible, as desired, to trace the focal point with the help of suitable software. In this way, it is possible to reduce the experimental expenditure on the spot.

Another example of intensive research in the field of noise reduction from the Technical Acoustics Department is shown in Figure 7, illustrating the DFVLR rotor experimental facility of the Aviation Mechanics Institute in a fuselage equipped with sensors. Noise and vibration levels are very high in one of the helicopter cabins. Conventional noise-proofing measures can considerably reduce the noise in the middle and higher frequency range but a low-frequency noise remains and it is an essential source of the aeroacoustically-induced alternating pressure field on the surface of the helicopter cabin. In addition to experiments with the DFVLR experimental helicopter BO 105, the DFVLR rotor experimental facility, in combination with suitably instrument-equipped fuselage models, aeroacoustic investigations were conducted in large wind tunnels by VW and Daimler-Benz and recently also in the DNW.

The experiments in the DNW confirmed that the new wind tunnel is outstandingly suited especially for acoustic investigations. It is therefore no surprise that the first orders contain acoustic investigations. On the basis of the DNW personnel structure, the FB-SM has now been asked especially to provide support along with the NLR.

Engine Technology

An important task can be found in the field of engine technology. In addition to the already mentioned supersonic intakes, the components of a jet-propulsion engine (compressor, combustion chamber, and turbine) are being investigated with the goal of increasing the efficiency, developing new design and follow up computation methods, and reducing the weight of the engines. One way to do that is the specifically goal-oriented design of blading which can be "tailor-made" by using modern computation methods. For aircraft engines, there is a requirement to implement the compressor-pressure ratio by increasing the aerodynamic stress with the smallest possible number of blades or stages. This can be achieved by specifying a pressure or speed distribution around the blade which is so optimized that the suction-side boundary layer will just barely not become separated. From that, the blade contour is then computed with the help of a method developed at the University of Stuttgart. The principle is currently being studied in a trans-sonic compressor stage whose original rotor, consisting of 60 conventional NACA-65 blades, has been replaced by a new rotor, which only has 31 super critical blades designed in this fashion. Measurements are in progress. The question as to whether the new rotor will reveal a sufficiently great stability range still is causing a certain amount of concern.

As part of the activities aimed at the use of progressive computation methods for the development of improved gas turbines, work is also being done on the computation of the flow field in combustion chambers. This problem is particularly difficult because the combustion of the liquid or gaseous fuel is in a reciprocal relationship with the always turbulent flow. A key to that situation resides in the development of suitable physical models for flows with heat supply, with which one can sufficiently accurately describe the complicated processes taking place in the flame at computer times which are still justifiable. This is why the development of the new miracle method is being supported through specifically goal-oriented experimental investigations on turbulent flames.

Progress made with the components of an engine is also being used in connection with turbo-machines in stationary operation: steam and gas turbines as well as radial and axial compressors. On the basis of the study entitled "Bedeutung der Triebwerksforschung und technologie fuer die Bundesrepublik Deutschland" [Significance of Engine Research and Technology for West Germany], November 1978, which was developed by DFVLR jointly with industry, a research program is currently being prepared in conjunction with industry represented in the FVV (Research Association for Combustion Power Machines), the colleges, and the DFVL.

Design Methods

During the annual main meeting in 1977, the aerodynamic blueprint of the DFVLR-F4 wing was introduced. This wing design was prepared from the following viewpoints: minimum induced resistance through elliptical lift distribution along the span, use of the advantageous properties of the DFVLR-F4 profile through implementation of profile pressure distribution on the wing and inclusion of aircraft fuselage in wing design. A local supersonic field is located over the entire span with a smooth recompression (super critical wing).

The results so far achieved with the DFVLR-F4 wing clearly show that the design requirements have been met and that improvements in the aerodynamics of present-day commercial aircraft are possible with the help of the knowledge we already have on the technology of the trans-sonic wing. In the case of the DFVLR-F4 wing, the improvement potential of the trans-sonic wing was used to make sure that the average wing thickness would be increased from 10.5 percent to 12.5 percent, compared to the Airbus-Standard and that the wing sweepback of the leading edge would be reduced from 30° to 27°. That leads to a wing which has a considerably lighter structure.

On the basis of the good results achieved so far and the fact that a wing with the latest technology was developed here, the GARTEur Group "Supercritical Wings" selected this wing as a test model. It is being studied in the trans-sonic wind tunnels of the NLR (Holland), the ONERA [National Office for Aerospace Studies and Research] (France), and the RAE (Great Britain) as a total model and in the TKG (Goettingen Trans-Sonic Wind Tunnel) as a half-model. Variable information is expected here on wind tunnel corrections and half-model technique.

The aerodynamic design and followup computation methods can also be applied to vehicles used in land transportation. Reference has been made earlier to the development of the bow shape for the experimental train of the German Federal Railroads. As an example from motor vehicle aerodynamics, Figure 11 shows the experimental vehicle C 111 of Daimler-Benz (see S.R. Ahmed, "Experiments and theoretical investigations on aerodynamics of road vehicles," DFVLR-NACHRICHTEN, No 31, November 1980, pp 4-7). The outside contour was panellized and recomputed. It turned out that the computation agrees rather well with a experiments on the topside (in this case, the middle cross-section) whereas considerable discrepancies still come up on the underside especially in the rear section. There, the flow is separated and cannot yet be pinned down with present-day computation methods.

Conclusion

The tasks and participation efforts presented here in the overall program of the DFVLR naturally can represent only a segment of the many different undertakings which are described in greater detail in the scientific report of the FB-SM.

So far we have not yet covered the relatively strong ties with industry, existing in the aviation and space field, in the area of turbo-machines and recently also vehicles and which has produced a situation where research orders were awarded to a considerable extent against the payment of full cost and where the earnings of the FB-SM during 1978 to 1979 numerically came to more than half of the total material expenditure, as shown in Figure 12. On the other hand, this served to point up the serious danger that research efforts conducted in partnership with industry reduce the necessary leeway available for original research so that the desired lead time prior to industrial development can no longer be materialized adequately. Here it remains to be determined whether the personnel of the FB-SM should be increased or whether there should be a reduction in contract research.

Figure 6. Determining the aerodynamic noise of fast-running trains.

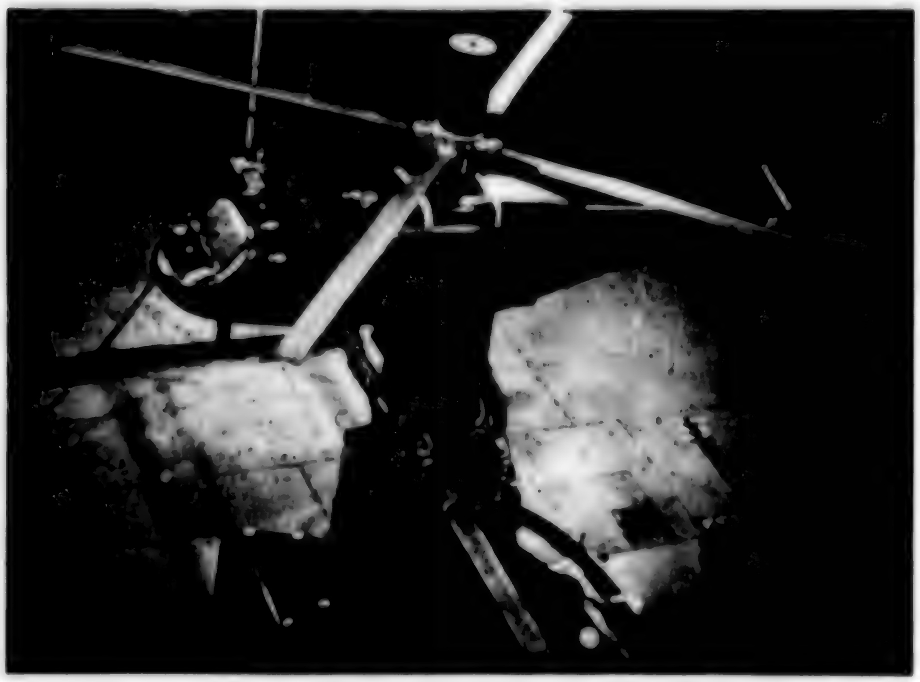

Figure 7. DFVLR rotor experimental system equipped with instruments for aeroacoustic investigations.

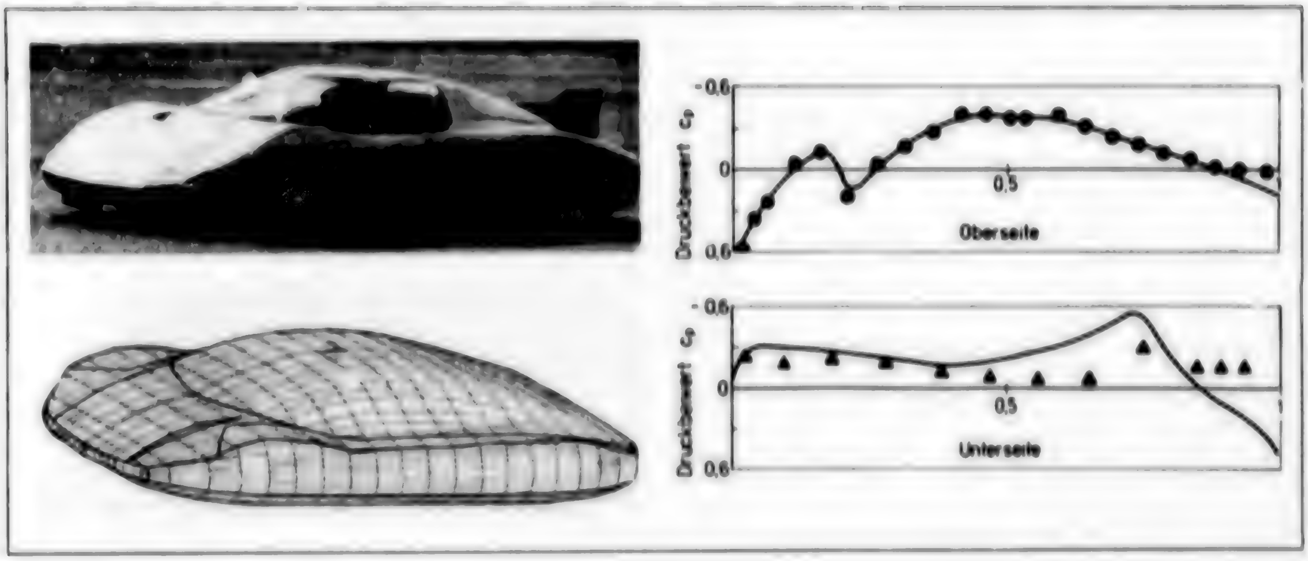

Figure 11. Theoretical and experimental investigations on vehicle aerodynamics. Key: 1--pressure coefficient; 2--topside; 3--underside.

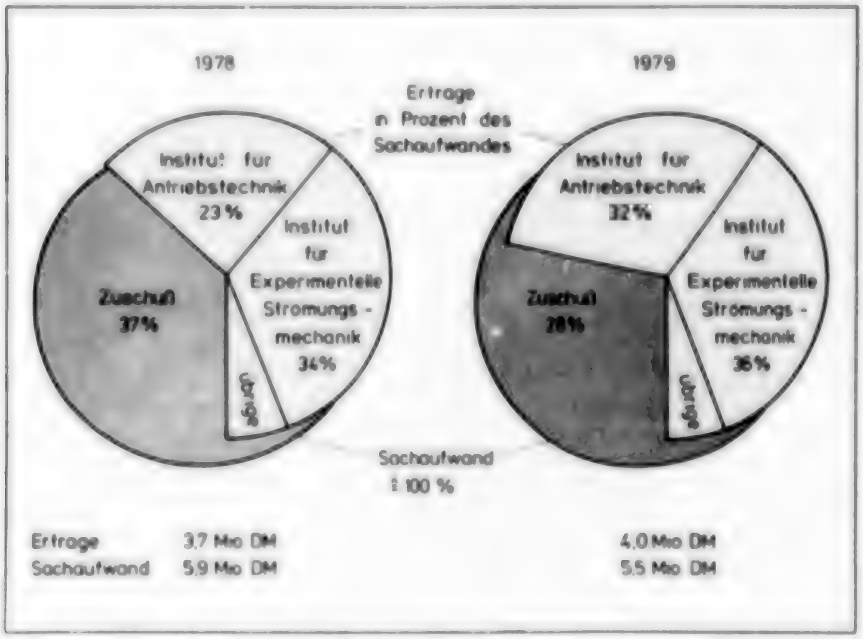

Figure 12. Comparison of material expenditure (excluding investments) and earnings of FB-SM. Key: 1--earnings in percent of material expenditure; 2--Institute for Engine Technology; 4--Institute for Experimental Flow Mechanics; 5--others; 6--subsidy; 7--earnings; 8--material expenditure; Mio--millions.

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TRANSPORTATION

MAGNETIC LEVITATION TRAIN TO RUN IN 1982

Duesseldorf VDI-NACHRICHTEN in German 10 Apr 81 p 14

[Article by Hans-Georg Raschbichler: "Magnetic Levitation Train To Run in 1982"]

[Text] Investigations and developments in systems analysis carried out during the last 10 years for an express train with electromagnetic ride and propulsion have shown that this new track-guided rail system has a good chance of becoming a reality in the foreseeable future, as a supplement to our other rail systems.

The levitation and guidance technology used on the magnetic levitation train at the International Transportation Exhibition (IVA) in Hamburg in 1979 and the long-stator propulsion technology that was actualized here for the first time could serve in a modified or improved version as a basis for the development of the 31.5 km "Emsland Transrapid Test Facility" (TVE), now under construction.

The facility has two turnaround loops, three sets of curved points and a test center. The planning, development and putting into operation of the Emsland Transrapid Test Facility is being carried out by a consortium founded in 1978, "Magnetic Levitation Train Transrapid." It consists of AEG-Telefunken, BBC [Brown, Boveri & Co], Dyckerhoff + Widmann, Krauss-Maffei, MBB [Messerschmitt, Bolkow, Blohm] (in charge), Siemens and Thyssen Industrie Henschel. The test facility at Emsland makes it possible to try out and time the planned cruising and maximum speeds for a high-speed rail system in the region of 400 km/hour under conditions approximating actual use.

Work on the construction of the guideway and the test center of the TVE was started in 1980. Now the external structure of the test center is complete, the manufacture and assembly of the guideway for the first "Kanaltrasse" section are at an advanced stage. Plans call for the first partial section of the Transrapid Test Facility to begin operation in 1982.

Rail transportation can be revolutionized with the magnetic levitation train "Transrapid," a new track-guided high-speed railway system. Introduced for the first time in 1979 at the International Transportation Exhibition (IVA), the silently floating "Transrapid 05," shown here, impressed not only passengers but spectators as well. Experts think it entirely feasible that the system, following autobahn and railroad lines, could replace medium-distance flights in Europe with speeds in the over 400 km/hour range. Tests with the "Transrapid 06" will begin in 1982 at the Emsland test track.

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TRANSPORTATION

DO 228: FLIGHT TESTS OF FIRST PROTOTYPE BEGIN

Paris AVIATION MAGAZINE INTERNATIONAL in French 15-30 Apr 81 pp 42-43

[Article by P.C.: "First Flight of the Do 228"]

> [Text] While the battle rages in the market for commuter aircraft of 30 and more seats, Dornier is beginning to market an airplane aimed at replacing the 15 to 20-seat first generations. Two versions are planned: the Do 228-100 (15 seats) and the Do 228-200 (19 seats). Flight tests of the first prototype have just begun. The two airplanes will be shown at Le Bourget in June where they will be among the exceptional novelties.

De Havilland Canada has succeeded in selling nearly 800 "Twin Otter" aircraft, a rugged and reliable twin turboprop with operating costs low enough to enable small regional airlines to blossom. The "Twin Otter" is now more than 15 years old, its first flight dating back to 1965, and technology has progressed sufficiently to make it possible to offer upon the market an airplane which retains the basic characteristics of the Canadian airplane, while providing superior performance giving a distinct economic advantage. At least that is the feeling within the German firm of Dornier.

Having a place in the commercial aircraft market with the Do 28 "Skyservant," Dornier first of all expanded the capacity of that airplane with new engines, hence the Do 128-2 and Do 128-6, which retain the general lines of the original "Skyservant." At the same time, by virtue of a studies contract with the Federal Ministry of Research and Technology, having developed a wing using new technology (called the TNT from the name of the contract: "Tragflugels Neuer Technologie [New Aircraft Wing Technology]" Dornier decided to go a step further by lengthening the Do 128 fuselage to obtain capacity of from 15 to 19 seats and adopting the new wing as well as suitable engines. Thus, in October 1979, the two Do 228 airplanes, which have now arrived at the flight test stage, were started.

At the technical level the Do 228 therefore appears as a combination of elements which have been proven for a long time: such is the case for the fuselage of the rectangular cross section and the tail unit. For the completely new elements, it is the case for the TNT wing, the two Garrett TPE 331-5 turboprop engines of 715 shaft horsepower (up to ISA conditions + 15°C) and the Hartzell four-blade propellers, 2.73 meters in diameter. The retractable tricycle landing gear is also new (twin wheels in front; a single wheel, retractable into the fairing as the main landing gear; low pressure tires).

The TNT wing consists of three elements: a central box spar which extends to the engine nacelles and two exterior wings. The Dornier Do A-5 profile closely resembles the NASA [National Aeronautics and Space Administration] GA(W)-1 developed for civil aviation but has a slightly lower thickness/chord ratio. It has low drag in cruising (Cz=0.5) as well as in ascent (Cz=1.2). Its maximum Cz value is high and it has a low negative lift coefficient. In practice, these characteristics result in improved performance in ascent and cruising.

Even though the structure of the fuselage remains conventional some use of composite materials is contemplated. The nose is made of Kevlar, as well as the wing tips and vertical stabilizer tip (and the leading edge of the stabilizer). Carbon may be used for the horizontal stabilizer and the wing flaps and ailerons. However, although originally so announced, carbon was not used in the first airplanes. At Dornier it is believed that its use will result in excessively high costs, considering the manufacturing facilities required.

For the rest the Do 228 is a conventional airplane, for which ruggedness, ease of maintenance, and flexibility of use were the qualities mainly sought.

In standard configuration the Do 228-100 has 15 seats spaced at 30 inches, 2 abreast with central aisles. Access is through a wide double door in the rear on the port side. The Do 228-200 has 19 seats arranged the same way. Baggage is divided between two compartments, one in the nose and the other in the rear. On the Do 228-100 they provide 0.12 cubic meter per passenger and on the Do 228-200, 0.17 cubic meter.

Various configurations were planned, with the possibility of passing easily from one to another. They range from all-cargo (the door, 1.28 meters by 1.34 meters, permits easy loading) to an executive version, with hybrid cargo/passenger versions in between. These arrangements provide Dornier with the ability to invade all the corresponding markets, from that of small military cargo aircraft to that of commuter aircrafts.

The Do 228-100 has flown; the -200 is to fly at the end of the month. The marketing which began at Farnborough in August 1980 has already had satisfactory results: options with paid deposits for more than 30 airplanes have been signed as well as firm contracts for the first 7 airplanes. The first ones will be delivered in 1982 (the first one is destined for Norway); as for mass production, it will not attain its steady pace until next year.

At present the Do 228-100 has achieved sales of DM 2.7 million (or 6.35 million francs at current rate of exchange) and the Do 228-200, DM 3 million (7.05 million francs).

Even though Dornier is aiming principally at the market share held by the "Twin Otter and the other first generation airplanes with convincing arguments, as the tables comparing characteristics and performance give evidence, the company perhaps is not expecting to stop there. The LTA 30-seat commuter airplane project, also based upon use of the TNT wing, was put on the shelf, notably for not having found a partner across the Atlantic capable of providing the promotion upon the North American continent, but the project is not completely dead. Moreover, improvements to the Do 228 are possible over the long term. It is with that end in view that Dornier, with Hoffman, is developing a new propeller.

Performance

Item	Do 228-100	Do 228-200	Twin Otter" series 300
Maximum cruising speed, km/hour	432	432	338
Takeoff distance at maximum load, meters	415	525	213
Maximum climb-rate at maximum load, meters per second	10.4	10.4	8.1
Same, on single engine	2.7	2.7	1.7
Practical ceiling with two engines, meters	9,020	9,020	8,138
Same, on single engine	4,265	4,265	3,535
Range with full passenger load, km	1,970	1,150	1,297

Cabin Dimensions

Item	Do 228-100	Do 228-200	"Twin Otter" series 300
Length, meters	6.30	7.08	5.64
Maximum height, meters	1.55	1.55	1.61
Maximum width, meters	1.35	1.35	1.50
Floor space, square meters	8.50	9.7	7.45
Volume, cubic meters	13	14.7	10.87

Exterior Dimensions

Item	Do 228-100	Do 228-200	"Twin Otter" series 300
Span, meters	16.97	16.97	19.81
Wing surface, square meters	32.00	32.00	--
Length, meters	15.03	16.55	15.77
Height, meters	4.86	4.86	5.94
Landing gear track, meters	3.30	3.30	3.71
Wheel base, meters	5.53	6.29	4.53
Maximum takeoff weight, kg	5,700	5,700	5,670
Maximum landing weight, kg	5,700	5,700	5,579
Maximum load (passengers, IFR [instrument flight rules] equipment, and two pilots), kg	2,207	2,057	3,363

PHOTO CAPTION

This hybrid with "Skyservant" fuselage and "Alpha Jet" landing gear has been serving as flying test bench for the TNT wing since 1979. According to Dornier the experimental results show a gain in full economy on the order of 25 percent. This aerodynamic research program is complemented by a composite materials structures study program.

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TRANSPORTATION

METHANOL BUS PARTICIPATES IN BERLIN TESTS

Duesseldorf VDI-NACHRICHTEN in German 27 Mar 81 p 6

[Article by hs: "Methanol-Gas Engine Works in Utility Vehicle"]

> [Text] Efficiency close to direct-injection diesel system. A large-scale experiment has been underway in Berlin since 5 March 1981, involving vehicles in which pure methanol (M 100) is used as fuel. A bus developed by Daimler Benz AG [incorporated], without public subsidy, is also included in this test; it is equipped with a "methanol-gas engine with energy recovery." Although equipped with external auto-ignition, its efficiency is reported to be very close to that of a direct-injection diesel engine.

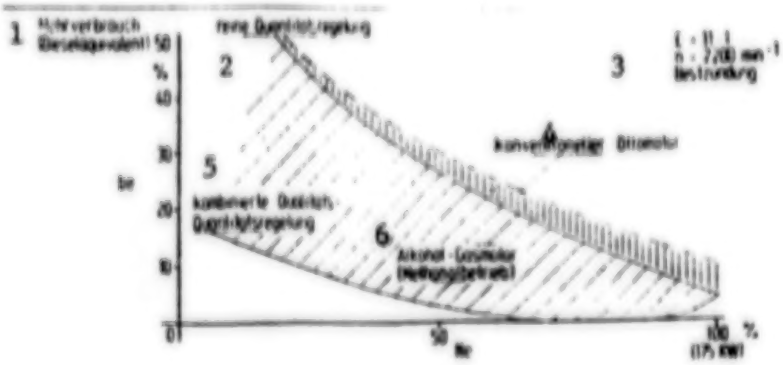
In presenting the O 305 bus equipped with the methanol-gas engine, Arthur Mischke, chief of utility vehicle development, Daimler Benz AG, stressed the fact that the company was very much concerned with developing--in addition to the ethanol engine developed in Brazil, using diesel combustion methods--also an engine for countries in which methanol is the alternate energy source for powering vehicles. While Brazil reportedly managed to retain the diesel combustion method, using an ignition accelerator consisting of TEGN (triethyleneglycoldinitrate), developed from ethanol, which is admixed with 4 percent, this is not possible in the case of methanol. Nevertheless it has been possible, using an internal-reciprocating combustion engine, to achieve methanol fuel consumption performances which, figuring in terms of energy, were within the order of magnitude of a good direct-injection diesel engine. An efficiency of 41 percent at the clutch can certainly be achieved.

The engine is an OM 407hGO, a variant of the OM 407hG developed for gas operation, used in the O 305/307 line buses. The horizontal in-line six-cylinder engine has a stroke of 11.4 lit, it puts out 147 kw at 2,200 min^{-1}, and it produces its highest torque with 840 nm [standard meters] at 1,000 min^{-1}. The methanol is evaporated in a countercurrent heat exchanger with the waste heat from the cooling water and gets into the mixture preparation unit via a steam pressure regulating valve. For a cold start, the methanol-powered outside heating unit of the bus must supply the necessary heat for about 5 minutes and that unit is supported here during the hot-running phase by a waste gas heat exchanger. When the engine has been heated up as a result of operation, the waste heat from the cooling water is then sufficient.

The engine is adjusted via a throttle valve which works up to about 70 percent of the torque, which is then completely opened and which leaves the remaining adjustments to the pressure regulator of the carburetor. Methanol combustion is completely smoke-free and makes very little noise in the entire operating range according to Mischke. The gaseous noxious substance emission reporteuly is insignificant so that there is no need to build in any waste gas catalysts. Because of its properties, the engine can be run very lean.

Mischke emphasized that the method developed by Daimler-Benz involves a "single-substance" solution which offers great savings and simplification. He did not expect the installation of methanol-gas engines, with energy recover, to cause a rise in the cost of line buses.

He confirmed that inquiries had been received from many European countries but also from Australia and New Zealand.



The diagram shows how little the additional consumption of the methanol-gas engine (OM407hGO) is compared to a diesel system. In the range from about 65 percent to 90 percent, the consumption of both engines is identical. Key: 1--additional consumption (diesel equivalent); 2--pure quantitative regulation; 3--optimum ignition; 4--conventional internal-reciprocating combustion engine; 5--combined quality and quantity regulation; 6--alcohol-gas engine (methanol operation).

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BRIEFS

ELECTRIC VEHICLES FOR UK--The British government is giving financial support to a new joint company for the development of modern electric vehicles. The electric vehicle programs of Lucas Industries and the Chloride Group have been merged in the new company, Lucas Chloride EV Systems. Government support is assured for an initial period of 5 years. Both Lucas and Chloride have been running electric vehicle programs for some time, in which Lucas has concentrated on 1-ton delivery vehicles and Chloride on 6- to 7-ton trucks with a payload of 1.5 to 2 tons. Lucas is also conducting parallel development of a hybrid passenger car. [Text] [Duesseldorf VDI-NACHRICHTEN in German 20 Mar 81 p 4] 9581

GAS TURBINE ENGINE READY--Researchers at the Lund Technical University in Sweden, in cooperation with United Stirling and United Turbine, companies with which Volvo is involved, and with support from the Goeteborg Technical University, Chalmers and the electrical firm Asea, have developed a new type of gas turbine engine for passenger cars. Last week the first Volvo 244 was equipped with this engine, and the researchers estimate they can begin a small production run in about 1985. As the scientists explained, they had solved what has been the biggest problem in the development of such an engine, namely the extremely high temperatures. The first experimental car is being run on diesel fuel. The engine has already completed a distance on a simulator equivalent to a crossing of the American continent without any significant problems. It was further stressed at the engine's introduction that it has the lowest fuel consumption and it is also the quietest, most durable and least polluting engine in the world. It remains to be seen what extent the experimental results can be converted into production and whether they differ materially from those under development in the United States and the FRG. [Text] [Duesseldorf VDI-NACHRICHTEN in German 13 Mar 81 p 60] 9581

CARBON-FIBER RUDDER FLIES--The A300 (D 03) owned by Airbus Industry recently flew for the first time equipped with a rudder made of CFK (coal-fiber-reinforced synthetics). This rudder, made by MBB [Messerschmitt-Boelkow-Blohm], so far is the biggest individual component built into the A300. Other, smaller CFK elements, such as spoilers, the main landing gear casing, air brakes, cabin floor supports, and terminal stops of the rudder assembly have also been built into a number of A300 aircraft in order to test their performance during flight operations and under differing climatic conditions. The introduction of CFK elements is part of a program designed to reduce the aircraft's weight. [Text] [Duesseldorf VDI-NACHRICHTEN in German 13 Mar 81 p 60] 5058

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